

## Grades 6–8: Geometry

**STANDARD** I. Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.

**EXPECTATION** A. Precisely describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties.

6	7	8
1. Compare and contrast prisms, cylinders, and pyramids with the polygons or circles that constitute their faces.	1. Classify polygons as regular or nonregular and investigate relationships between the number of diagonals and the number of sides of a regular polygon.	1. Identify the necessary and sufficient properties that characterize quadrilaterals.

**EXPECTATION** B. Understand relationships among the angles, side lengths, perimeters, areas, and volumes of similar objects.

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1. Describe relationships among angles, side lengths, perimeters, and areas of similar polygons.	*1. Describe relationships between the edge lengths and the volume of similar prisms.	*1. Describe how a change in the edge length affects the angle measures, perimeters, and areas of similar regular polygons.

**EXPECTATION**

C. Create and critique inductive and deductive arguments concerning geometric ideas and relationships, such as congruence, similarity, and the Pythagorean relationship.

6	7	8
1. Identify and describe point and line symmetry in two-dimensional shapes.  2. Distinguish between similarity and congruence.	*1. Compare and contrast attributes of similar figures and the attributes of congruent figures.  2. Apply the Pythagorean relationship to determine if a triangle is a right triangle.  *3. Apply the Pythagorean theorem to find the missing length of a side of a right triangle.	1. Given the length of three segments, determine and explain whether or not they can form a triangle.  2. Apply the Pythagorean relationship to determine if a triangle is a right triangle.  *3. Apply the Pythagorean theorem to find the missing length of a side of a right triangle.

**STANDARD**

II. Specify locations and describe spatial relationships using coordinate geometry and other representational systems.

**EXPECTATION**

A. Use coordinate geometry to represent and examine the properties of geometric shapes.

6	7	8
1. Given the coordinates of three vertices of a rectangle or square oriented horizontally or vertically, use the first quadrant of the rectangular coordinate system to locate the other vertex.	1. Identify and graph ordered pairs in the four quadrants of a coordinate plane.	*1. Given the coordinates of a vertex and the length of adjacent sides of a polygon, use the rectangular coordinate system to locate other vertices of a square, rectangle, or right triangle.

**EXPECTATION**      B. Use coordinate geometry to examine special geometric shapes, such as regular polygons or those with pairs of parallel or perpendicular sides.

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1. Plot the vertices of squares and rectangles and determine the relationship among the coordinates.	* 1. State relationships among the coordinates of the vertices of rectangles, squares, parallelograms, trapezoids, and rhombuses oriented horizontally.	

**STANDARD**      III. Apply transformations and use symmetry to analyze mathematical situations.

**EXPECTATION**      A. Describe sizes, positions, and orientations of shapes under informal transformations such as flips, turns, slides, and scaling.

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1. Describe the transformation used to move a polygon from one location to another in the first quadrant.	1. Describe the transformation used to move a polygon in one quadrant to another quadrant in the coordinate plane.	1. Apply dilations and describe their results.

**EXPECTATION**      B. Examine the congruence, similarity, and line or rotational symmetry of objects using transformations.

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* 1. Apply a transformation to a polygon and describe how it has changed.	1. Determine the type of symmetry (point or line) found in a reflection or a rotation.	1. Determine the equivalence, if any, between multiple applications of one transformation and the application of a different transformation.

**STANDARD**

**IV.** Use visualization, spatial reasoning, and geometry modeling to solve problems.

**EXPECTATION**

A. Draw geometric objects with specified properties, such as side lengths or angle measures.

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1. Use symbols for parallel lines and perpendicular lines to describe polygons and figures where appropriate.	*1. Draw two-dimensional objects from a geometric description and write a description of geometric properties for a given object.	1. Identify the congruent and supplementary relationships of the angles formed by parallel lines and a transversal.

**EXPECTATION**

B. Use two-dimensional representations of three-dimensional objects to visualize and solve problems such as those involving surface area and volume.

6	7	8
*1. Given the top, side, and front views, construct a three-dimensional model using cubes.	1. Construct nets for three-dimensional figures.  2. Compare and contrast the number of faces, vertices, and edges of three-dimensional figures.	1. Use isometric drawings of three-dimensional figures to build the model with cubes.  *2. Determine the changes in volume and surface area of three-dimensional figures that can be built with cubes when one or more measurements are changed.

**EXPECTATION**

C. Use visual tools such as networks to represent and solve problems.

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	1. Given a network with up to six vertices, determine the number of paths.	1. Construct a network to solve a problem situation.

**EXPECTATION**

D. Use geometric models to represent and explain numerical and algebraic relationships.

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		1. Use an area model to analyze probability.

**EXPECTATION**

E. Recognize and apply geometric ideas and relationships in areas outside the mathematics classroom, such as art, science, and everyday life.

6	7	8
1. Identify and apply geometric concepts in a variety of practical contexts.	1. Identify transformations in tessellations, use transformations to draw tessellations, and describe relationships among figures that tessellate.	1. Identify applications of transformations such as tiling, fabric design, art, and scaling.